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ABSTRACT

This agriculture extension service publication from Pennsylvania State University introduces the identification and control of common ornamental insect pests. For each of the insects or insect groups (i.e. aphids) identified in this publication, information on host plants, pest description, and damage caused by the pest is given. Also a calendar of insect problems and suggested control methods is included. This calendar indicates the insect pests, control insecticides, and the recommended concentration of insecticides with some application information according to treatment times. Insects mentioned in this publication are listed alphabetically and include Bagworm, Bronze Birch Borer, Dogwood Borer, Elm Bark Beetle, Gypsy Moth, Japanese Beetle, Lilac Borer, Oak Leafroller, Pine-Needle Scale, San Jose Scale, Spruce Budworm, and White-Pine Weevil. (MR)

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College of Agriculture, The Pennsylvania State University, University Park, Pennsylvania

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IDENTIFICATION AND CONTROL
OF COMMON INSECT PESTS
OF ORNAMENTAL SHRUBS AND TREES

APHIDS

Host: Most plants.

Description: Aphids are soft-bodied, fragile-looking, sucking insects, most commonly green, pink, or black. They are usually 1/16 to 1/8 inch long, and may be winged or wingless. They have beaks for sucking plant sap, and most species have two tubes projecting up and backward from near the tip of the abdomen. Aphids excrete honeydew; some secrete a white waxy substance which gives them a cottony appearance. Some live on only one host, while others require several hosts to complete their life cycles.

The life cycle varies among species. In a typical cycle, aphids overwinter as eggs. The female gives birth to living nymphs which mature in a few days and give birth to more nymphs. The process continues until the colony becomes overcrowded. Then a generation of winged females moves to other locations and starts new colonies. The females continue to produce nymphs until late fall when a generation of winged males and winged females produces the overwintering eggs.

Damage: Large infestations of aphids usually produce noticeable amounts of honeydew, which attract swarms of insects and on which a black sooty mold may grow. The honeydew is somewhat shiny. Curling, distortion or premature dropping of leaves and malformation of buds results from the feeding of the aphids. Other aphids produce galls on leaves or needles or swelling of woody parts of the tree.

Aphids injure the general health of their hosts. Leaf-feeding aphids cause curled and distorted foliage and malformed buds. In root infestations, injuries and malformations interfere with plant nutrition. In other cases, unsightly galls are produced. Aphids also transmit virus diseases which may be extremely damaging to plants.

ARBORVITAE LEAFMINER

Host: Arborvitae.

Description: This is a very small light-gray moth with a wingspread of 1/3 inch. The adult lays eggs on the leaves in May and June. In three weeks,

the larvae hatch and begin to feed inside the leaves. They overwinter in the leaves as small (1/5 inch) reddish-green worms with black heads and short bristles across the back of each segment.

Damage: The tiny larvae feed on the cellular tissues inside the tips of the leaves, causing them to become whitish, yellowish, and finally brown. The damage can be distinguished from other browning by the presence of the larvae in the tips (in early spring or late summer) or the hollowed-out places left by the larvae.

Serious infestations cause trees to appear brown and sickly.

BAGWORM

Host: Many trees, including arborvitae, spruce, hemlock, red cedar, willows, maples, and lindens.

Description: Eggs laid in September or October overwinter in a bag constructed by the female. The larvae emerge from the bags in late spring and begin to feed and construct larger bags. They take their bags with them, fastening them with a bit of silk when they stop to feed. In the fall, the bags are one to two inches long and 3/4 inch in diameter.

The female moth is wingless, has no functional legs, and resembles a larva. The male moth is sooty black with broadly feathered antennae and hairy body and legs. The wings are almost transparent and have a spread of about one inch.

Bagworms are not a pest in the northern half of Pennsylvania.

Damage: The insects may nearly defoliate even large trees, seriously disfiguring but seldom killing them.

BIRCH LEAFMINER

Host: Most birches.

Description: This small (1/16 inch), black sawfly overwinters as a pupa in the soil. The adults emerge in early May and deposit their eggs in the young leaves. The larvae hatch in about one week and begin to feed inside the leaf. In about two weeks, they drop to the soil to complete their development in an earthen cell about two inches below the surface of the soil. A cycle from egg to adult is completed in six weeks, and two or three generations are produced each year.

Damage: The first indications of damage are the small blistered, translucent spots in the leaves caused by the feeding larvae. Later the leaves may be completely mined, giving them a puffy appearance; the leaves then brown, shrivel, and drop prematurely. The tree becomes unsightly and may be weakened by repeated heavy infestation.

BLACK VINE WEEVIL

Host: Rododendron, yew, hemlock, and many other nursery plants.

Description: The adult weevils are about 3/8 inch long and have short snouts. They are black with patches of yellowish hairs on their backs. The weevils appear during June and July and feed on foliage at night. As they cannot fly, a main means of movement is in plants which have been balled and burlapped. Approximately four weeks after they emerge, the adults lay eggs. White,C-shaped grubs hatch and feed on small roots. The mature larvae are creamy white with chestnut brown heads, and are 3/8 to 1/2 inch long. Winter may be passed in either the larval, prepupal, or--less frequently--the adult stage.

Damage: One of the best early indications of the presence of these weevils is the feeding damage done by the adults to the leaves. Characteristic crescent-shaped notches are made on the leaf margins of yew and broad-leaved plants. Adult weevils hide during the day under soil and debris at the base of the plant or in the forks of branches. As the infestation progresses, yellowing foliage may be noticed.

Plants infested with black vine weevil often turn off-color and appear unthrifty; newly transplanted stock may die before it can become established. When large numbers of grubs are feeding on the root system, even well-established plants may die, particularly if drought or some other environmental abnormality occurs simultaneously.

BRONZE BIRCH BORER

Host: Dying or weakened ornamentals such as birch, beech, and aspen.

Description: This beetle is a flat-headed borer. It is slender, pointed, olive-bronze, and about 1/2 inch long. The larva is slender, white, flat-headed, and legless, with an enlarged area at the back of the head and two small horny pincers at the posterior end. When mature, the larva usually measures about 3/4 inch in length. The adults feed on foliage for a time, then lay eggs in slits in the tree bark in April or May. As soon as the larvae hatch from the eggs, they penetrate the bark and begin to feed on the cambium until they reach maturity.

Damage: The first indications of the borer's presence are ring-like ridges that encircle the trunk and limbs, and dark brown spots made by the entering borers. The borer produces flattened,sawdust-packed tunnels just under the

bark which spread in all directions and, when extensive, may cause loosening of the bark. Dying foliage and dead twigs and branches are secondary signs of infestation. This is first noticed in the tops of the trees.

This insect frequently kills ornamentals.

CANKERWORMS--FALL AND SPRING

Host: Fruit trees, oak, elm, basswood, linden, birch, and maple.

Description: The adult fall cankerworms emerge from pupal cocoons in the soil in late fall after a frost. (Some may emerge in the spring.) The male moth is brownish-gray with a wingspread of 1 1/4 inches. The wingless female moth is shiny, dark-gray, and about 1/2 inch long. The gray-brown eggs, laid in clusters of approximately 100 on the smaller branch twigs, may be in a flat flower-pot-shaped mass or may encircle a small twig. The eggs overwinter and hatch in early May; for a period of four to five weeks the young light-green to brownish-green "measuring worms" with striped backs feed on the tender new leaves. When full grown, they enter the soil to form a cocoon, and remain in the pupal stage until fall.

The adult spring cankerworms emerge from the soil soon after the frost has left the ground. Eggs are deposited in crevices in the bark in masses ranging from a few to more than 100. The larvae hatch in early May and feed on tender leaves. They are yellowish-green to yellowish-brown with a gray-white head mottled with brown, and are about 3/4 to 1 inch in length when full grown. They then enter the soil for pupation at about the same time as the fall species, but rather than form a cocoon, they pupate in an earthen cell. The adult male moths are silky gray and have three dark lines across the forewings. The wingspread is about 1 to 1 1/4 inch. The female is wingless, whitish and brown or black, but not uniform in color.

Damage: The first signs of infestation by the fall cankerworms are the male moths in late fall flying near the ground around tree trunks or resting on the bark. The adults of the spring cankerworm appear in early spring. The larvae of the two species often feed together, eating irregular holes through the leaves. If the infestation is heavy, most of the leaf tissue is consumed, with only the larger veins and mid-ribs remaining.

Large infestations of these insects can almost completely defoliate the host tree. Several years of successive defoliation may kill the tree.

COOLEY SPRUCE GALL APHID

Host: Blue spruce, fir.

Description: This insect is seldom seen, except for the form which produces cottony masses on the undersides of the needles of Douglas firs. In the spring, the overwintering stem-mother lays eggs on the spruce. The young insects hatch and feed on the new needles, causing the spruce to produce the large terminal galls which enclose them. They mature inside the galls and emerge as winged adults, some of which fly to Douglas fir to lay eggs. The next generation returns to the spruce to produce the overwintering generation to continue the cycle.

Damage: The aphids' sap sucking causes the tree to produce one- to three-inch growths called galls. In early summer, the galls are greenish with red-to-purple cross markings. In mid-summer after the galls open, they are reddish-brown. The galls occur only at the twig tips of blue spruce. The tree needles included in the gall are usually the normal length.

On spruce, the large galls cause an unsightly appearance. Young trees may be killed or their growth retarded, and other harmful insects may attack. Douglas fir needles may become yellow and disfigured, and needles may fall prematurely.

COTTONY MAPLE SCALE

Host: Maples--silver, Norway, and sugar--and many other deciduous trees.

Description: The female is a small, brown, flattened insect about 1/8 inch long which has attached itself permanently to the bark. In the spring when sap begins to move, the scale grows rapidly and lays as many as 1,000 eggs in cottony masses. The eggs hatch in mid-June, and crawlers move to leaves where they suck the sap from the veins. They mature in late summer; following mating, the males die and the females crawl back to the twigs for winter. This scale is usually found on the undersides of twigs and branches; it is most conspicuous in late June or early July when the large, white egg sack is developed. The developing egg mass, with its cottony appearance, causes the body of the female scale to be elevated to an angle of about 45 degrees.

Damage: Infestation by this insect may cause the foliage to yellow or to become sooty with mold, and to drop prematurely.

DOGWOOD BORER

Host: Flowering dogwood.

Description: The dogwood borer is a small, blue-black clearwing moth with two yellow stripes on the abdomen, yellow-banded legs, and a wingspread of 3/4 inch. The larvae, which are white with light-brown heads, bore in the cambium after gaining entrance through wounds or under rough bark.

The larvae overwinter in the bark, continue feeding, and then pupate in the spring. The adult moths emerge in May and June, and deposit their eggs on branches and twigs, often near wounds.

Damage: Trunks of trees infested by these borers will be swollen, knotty, and calloused from the root collar to the lower branches. There may be injury to the branches as well, but in young trees the crown is usually affected. Borings may also be present on the bark or near the bases of infested trees.

Borers cause areas of bark to die and may girdle and kill branches or whole trees.

DOGWOOD CLUB-GALL MIDGE

Host: Flowering dogwood.

Description: The adults are small and reddish-brown, and may resemble small mosquitoes. They emerge from the ground in late May, and about a month later attack the young shoots. This produces the club galls on the tips. Inside the gall, the eggs hatch into small, orange maggots about 1/8 inch long; in late September the maggots drop to the ground to overwinter.

Damage: The first signs of this insect are the wilted and deformed leaves at the tips of the branches. On the tips of smaller twigs, the galls appear as distinct swellings varying in length from less than 3/8 inch to more than two inches, and in diameter from 3/16 inch to 5/16 inch at the thickest point. Both ends are tapered.

A serious infestation will stunt the tree. The galls may hang on the tree for a year or longer.

EASTERN SPRUCE GALL APHID

Host: Norway spruce is more seriously infested than are white, black, and red spruce; blue spruce is not attacked.

Description: This aphid spends the winter as a nymph under the bud scales at the bases of buds. The waxy-covered nymphs mature in April and May and start to deposit eggs and to feed on those shoots already swollen by the feeding of the stem-mother. The attacked needles continue to swell until they produce a gall which encloses the insects in pockets.

A gall contains about 100 pockets, each of which holds approximately 12 aphids. Late in summer, the galls open and the winged female adults emerge. The females deposit eggs on the needles of the host trees and die immediately. The eggs hatch in about two weeks and the young crawl to the new growth where they begin to feed.

Damage: The feeding by the aphid nymphs stimulates the twigs to produce pineapple-shaped galls. In early summer, the galls are greenish with red to purple cross markings. In late summer after they open and the aphids emerge, the galls are reddish-brown. The formation of the galls is rapid, usually being completed in less than a week, and the size may vary from about 1/4 inch to nearly 2 inches.

Injury to the host tree is caused by the galls. As many as 85 percent of the gall-infested twigs may die. The galls from the previous year are brown and unsightly.

EASTERN TENT CATERPILLAR

Host: Wild cherries and apples are the preferred hosts, but other plants such as peach, hawthorn, plum, pear, and a few deciduous shade trees may be attacked, particularly when the favored host trees are not available.

Description:

The moth of the eastern tent caterpillar has a wingspread of about one to two inches. It is stout-bodied and dull reddish-brown, with two light stripes crossing the fore wings. Eggs deposited by the adult female during July overwinter; they begin to hatch during the first warm spell in spring. The gregarious larvae soon begin to construct their tent of silk in a crotch of the tree and enlarge it as they grow. In about six weeks they are full grown--about two inches long. The head and body are deep black with a white stripe along the back and many short irregular markings along the side of each segment. On each side is a row of oval pale-blue spots surrounded by black. The mature larvae leave the tree and crawl to protected places to pupate. They spin a cocoon, about one inch long, composed of white silk mixed with a yellow powdery substance. The pupal stage lasts about ten days to two weeks, after which the adult moths emerge; they are active during late June.

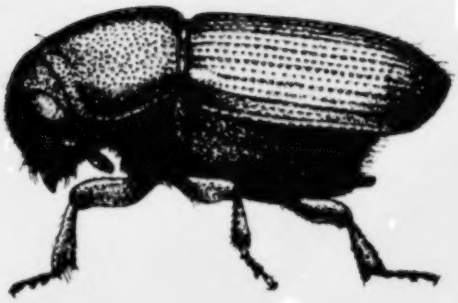
Damage: The brown egg masses encircle the twigs and are inconspicuous. The silky white weblike nests or tents are the most familiar sign and distinguish it from the forest tent caterpillar which does not make tents.

When abundant, the eastern tent caterpillars often defoliate entire trees, which weakens but seldom kills them. The tents are an objectionable sight and the crawling larvae are often a considerable nuisance.

ELM BARK BEETLES

Host: Elms.

Description: Two species of small (1/8 inch), reddish-brown bark beetles are common pests of elm trees. They overwinter under the bark as either larvae or adult beetles. Emergence starts in May when the beetles fly to healthy elm trees to feed on the bark in the crotches of twigs. This feeding process spreads Dutch elm disease to healthy trees. After feeding on healthy trees, the beetles lay their eggs in dead or dying elms.



Damage: Evidence of bark beetles breeding in dying and dead trees will show up as small shot-holes in the bark or the many-branched gallery pattern etched on the inner bark and surface of the wood. If bark beetles were not vectors for Dutch elm disease, damage to healthy trees would be slight.

EUONYMUS SCALE

Host: Euonymus, bittersweet, pachysandra, and English ivy if growing near other infested plants.

Description: The male scales are visible on stems and undersides of leaves; they are bright white and elongate with single longitudinal ridges on their backs.

The female scale is dark brown, and shaped like an oyster shell. The scale overwinters as a mature female, producing pale yellow crawlers in May. One or two additional broods of crawlers are produced each year.

Damage: Heavy infestations will kill twigs, branches and plants within a few years. Ground covers turn yellow and may be killed.

EUROPEAN PINE SAWFLY

Host: The favored hosts are red, Scotch, Japanese red, and mugho pines.

Description: The full-grown larva is about 7/8 inch long, with a black head and gray-green body with a light stripe down the back and two white lines bordering a broken stripe of intense green. In late summer the larvae pupate after dropping to the ground. The adults emerge and resemble small bees. The females lay eggs in slits in the needles of pine where they have overwintered. Hatching takes place in late April

or in May. The young larvae are green with black heads, and blend so well with the needles that they may not be noticed until considerable damage is done.

Damage: The young gregarious larvae of this sawfly feed on only the sides of old needles. When the larvae mature, they eat entire needles. A single terminal shoot may have hundreds of larvae feeding on it.

Severe defoliation often takes place. Since the insect prefers mature foliage, the tree is often left bare except for the new growth at the tips of the branches.

FLATHEADED APPLE TREE BORER

Host: Crabapple and other flowering trees.

Description: The adult is a shiny bronze and brass-colored beetle about 3/4 inch long. The larvae are typical flatheaded borers with the thorax flattened and wider than the head and abdomen. The borers are creamy white and as long as one inch.

Damage: The larvae feed in the cambium and sapwood through the summer and then bore into solid wood where they overwinter. They usually feed on the main trunk of the tree near the ground level. Young trees are often girdled, and either severely damaged or killed.

FLETCHER SCALE

Host: Arborvitae, yew and juniper.

Description: The female scale is light brown, globular, about 1/8 inch long, and looks wrinkled. The male scale is smaller, flattened, and nearly transparent. As many as 800 eggs are deposited under the female scale in June, and the young hatch as crawlers in July. They overwinter as small, flattened scales with a thin covering of transparent wax.

Damage: Unless the infestation is allowed to proceed to the point of weakening the plant, the only easily recognizable sign is the presence of the female scales on the bark. Needles may have a black, sooty appearance.

Heavy infestations lead to a general weakening of the host plant.

GYPSY MOTH

Host: Most hardwoods and evergreens, especially oak.

Description: The male moths are dark brown and active fliers during the day and at night. They have a wingspread of about 1 1/2 inches. The heavy-bodied females are mostly white with black dots and markings, and have a wingspread of about 2 inches; they seldom fly. They are present during July and August. Egg masses contain from 25 to 250 eggs, and are deposited on stationary objects. The egg masses are covered with the buff-colored hairs from the female's larvae hatch in early May. Young larvae are dark and hairy. Full-grown larvae are about 1 1/2 to 2 inches long, dark, with five pairs of red warts and six pairs of blue warts down the back.

Damage: The small larvae are dispersed by wind or air currents. Unless the population is extremely high, the older larvae feed only at night and crawl down the trees during the day to seek shelter. Complete defoliation of infested forests have been common. One of the most troublesome aspects of this insect in residential areas has been the nuisance of the caterpillars crawling on buildings, walks, driveways, and roads.

NATIVE HOLLY LEAFMINER AND EUROPEAN HOLLY LEAFMINER

Host: American and English holly.

Description: The adult is a tiny, black fly, 1/32 to 1/16 inch. They emerge in late May from pupation, when only a few new leaves have developed. The female punctures the leaf surface, and both male and female feed on the sap. Eggs are laid in small slits in the lower leaf surface. The small yellow-white maggots hatch and mine within the leaves. At first unnoticeable, the mines broaden and the larvae grow. The mature larvae, about 1/8 inch long, overwinter in the mines and continue feeding in spring. There is one generation per year.

Damage: First evidence of their presence is small red or purple spots on the leaves. As the larvae grow and mine between surfaces of the leaves, a pattern develops which is characteristic of the respective leafminer. The native leafminer forms a winding snake-like mine; the European leaf-miner makes a blotch-type mine. Leaves may be stunted and twisted by the punctures made by the ovipositors of feeding females, and may drop prematurely.

New leaves are disfigured by extensive mines or by the punctures made by the female for feeding or laying eggs. Loss of foliage and growth retardation may result from heavy infestations.

HONEYLOCUST PLANT BUG

Host: Honeylocust.

Description: This small, pale-green, plant bug is approximately 1/8 inch long. The life cycle is not known, but there appears to be only one generation per year in this area.

Damage: This sucking insect concentrates its feeding on the tender new growth. The result is twisted, stunted new terminals with sparce, malformed leaflets. The plant bugs usually appear on the foliage in May, and the typical damage symptoms become evident at about the same time. Large infestations result in sparce foliage with practically no growth during the season.

JAPANESE BEETLE

Host: Most broadleaved ornamentals.

Description: The beetles are about 1/2 inch long with metallic-green bodies, coppery-brown wing covers, and six small patches of white hairs along the sides and on the back of the body. They overwinter as grubs under the soil surface, pupate in late May and in June, and begin to emerge as adults in late June.

Damage: The adult beetles are active during warm, sunny days from early July until September. The beetles feed on the flowers and foliage of shade trees and ornamentals, leaving the veins of the leaves untouched. Although this feeding seldom kills a plant, the brown, damaged leaves are unsightly.

JUNIPER SCALE

Host: Ornamental junipers, native cedars, and cypress.

Description: The young yellow to orange crawlers emerge in late May to early June and move to new growth where they begin to feed and mature. In late summer the scale is white; the males are whiter and smaller than the females. The nearly mature female winters on the needles.

Damage: The female scale is usually evident on the twigs of infested plants. The plant assumes an unhealthy appearance due to the warm-weather feeding of the crawlers. The tips of the needles curl downward, and later the entire needle acquires a yellow cast. Heavy infestations destroy the ornamental value of the plants.

LACE BUG--AZALEA AND RHODODENDRON

Host: Azaelea, rhododendron, mountain laurel, Pieris.

Description: Both types of lace bugs overwinter in the lower leaf tissue as

eggs covered by brownish scabs or shields. In May or June, the eggs hatch into small spiny nymphs which begin to feed on the lower leaf surfaces. The adults are about 1/8 inch long, with wings marked in a lace-like pattern. The life cycle is completed in 35-45 days. The generation occurring in late summer or early fall produces the overwintering eggs.

Damage: Before damage becomes severe, pinprick-like feeding spots can be seen on the undersides of the leaves. If feeding is extensive, the spots merge and the entire leaf appears grayish-green or bronze. The excretion of the insects forms brown, varnish-like sticky spots on the lower surfaces of the leaves.

These insects spoil the appearance of the plant, reduce vigor and cause infested leaves to fall prematurely.

LEAFROLLERS ON FLOWERING TREES

Host: Most broadleaf trees and shrubs.

Description: At least six common species of leafrollers damage the developing tips and leaves each spring. The destructive stage is the small, very active, green or yellowish larvae that can be found in silken nets within a folded leaflet. Most worms are smaller than 3/8 inch.

Damage: Three leafrollers commonly found on flowering ornamentals are the fruit-tree leafroller, the oblique-banded leafroller, and the red-banded leafroller. During May, the larvae feed on the developing buds and terminals, causing deformation or death of those plant parts. The adult leafrollers are small moths with rusty-brown wings marked with white lines; the wingspread is approximately 3/4 inch.

LILAC BORER

Host: Lilac and mountain ash.

Description: The adult moths are somewhat wasp-like in appearance with a wingspread of about 1 1/2 inches. The front wings are dark brown and the rear wings are clear. The legs have bright yellow markings. The larvae that bore in wood are white, fleshy, and up to 1 1/2 inches long.

Damage: The moths deposit their eggs during June and July on the bark near ground level. The larvae bore into the bark and feed until cold weather. They pass the winter in the wood as half-grown larvae. They complete feeding in the spring, pupate in late May and in June, and emerge as moths in June and July. Infested lilac canes are swollen near the base. In the cracked bark are usually a number of small holes around which sawdust can be found. Such canes are usually wilted or dying.

MAGNOLIA SCALE

Host: Several species of magnolia, including M. soulangeana.

Description: The adult female is hemispherical and about 1/2 inch in diameter. It is a rich-brown color covered with an abundance of white waxy substance. The young hatch from eggs deposited under the female scale and emerge as crawlers in mid-to late August. The crawlers move toward the tips of branches and settle down to feed. They overwinter as immature scales.

Damage: When the female scales heavily infest a host, the branches and twigs look as though they are covered with masses of white cottony material. If the body of a scale is removed from the plant, an elliptical scar with four distinct white lines converging toward the center is left on the bark.

Leaves may not develop fully; trees become generally unhealthy. A black sooty mold grows on the honeydew secreted by the scales.

MAPLE BLADDER-GALL MITE

Host: Mainly silver and red maples.

Description: White, pink, or red mites overwinter as eggs on the tree and develop about the time the buds are beginning to turn green.

Damage: These galls usually appear on the upper surfaces of the leaves and vary greatly in shape, but are generally wart-like and about 1/8 inch in diameter. The galls are light green or yellowish-green when first formed, but later become pinkish or rose colored, and finally, at the end of the season, black. They are often so numerous that they cover the entire leaf.

Leaves are deformed and unsightly if the galls are numerous.

MITES--VARIOUS SPECIES

Host: Many evergreens, shade trees, and shrubs.

Description: Mites are more closely related to spiders than to insects, as the adults have four instead of three pairs of legs. They vary in length from 1/80 to 1/50 of an inch. Most species lay eggs, but some produce living young. The young mites resemble the adults, but are smaller and have three pairs of legs. Mites may overwinter as adults or eggs, depending on the species and location. There may be 15 to 20 generations per year. Generations overlap and all stages can be found at any time during the summer. The following are descriptions of some of the mites commonly found in Pennsylvania nurseries:

The TWO-SPOTTED SPIDER MITE seriously damages almost all ornamental plants. The female varies from a pink or greenish color to brilliant red with two dark spots on the back. The male resembles the female but is smaller.

The CLOVER MITE may infest species of Malus and Hedera, English elm, honeysuckle, gooseberry, grasses, and clover. The body is reddish or brownish.

The EUROPEAN RED MITE causes serious damage to deciduous fruit and ornamental trees and shrubs. The adult is brick red and without spots.

The SPRUCE SPIDER MITE may be found on spruce, hemlock, arborvitae, pine, and fir. This mite is dark green to black.

The OAK MITE infests oak, beech, birch, and others. The body color is dull red.

Damage: Inspection of twigs with a hand lens will reveal mites in the early levels of infestation. Mites can also be shaken onto a piece of paper held below a branch. When infestation is more serious, the foliage is mottled and yellow, and may eventually turn brown or bronze and drop prematurely. A fine webbing, especially noticeable on the undersides of leaves, is characteristic of mite-infested plants. Empty egg shells and cast skins may be seen even when the mites are not present.

Infested plants have an unhealthy appearance. Newly transplanted stock may be killed. Damage is most severe during periods of hot, dry weather.

OAK LEAFROLLERS

Host: All types of oaks.

Description: Two species of these insects, very similar in appearance, have caused heavy mortality to oaks in Pennsylvania during the past decade. The adult moths are basically yellowish-brown with dark markings on the wings. The larvae are up to 1/2 inch long and are dirty-white to light green. One generation is produced each year. The moths are active in late June and early July. The females deposit eggs on the bark of two-year-old twigs, where they overwinter.

Damage: Larvae begin to hatch in early May and start to feed on buds and developing leaves. The oak leafroller damages the oaks, and also shade and ornamental trees. The oak leaftier is primarily a pest on the red oak group. Depending on the number of larvae, damage may be no more than a few holes or ragged leaves, or may be as extreme as complete defoliation.

OYSTERSHELL SCALE

Host: Lilac, dogwood, ash, poplar, willow, red maple, silver maple, linden, rose, and other plants.

Description: As the name implies, this scale resembles an oyster shell. It is grayish-brown and shiny, has many cross-ridges on its body, and is longer than it is wide. It overwinters as white eggs under the female scales. These eggs hatch late in spring when the leaves are fully developed. The barely-visible white crawlers are active for only a few hours before settling to feed. The females remain where they settle, but the males change into small yellowish two-winged insects that die after mating. In late fall, the female lays her eggs and then shrinks and dies.

Damage: Infested branches may sometimes be completely covered with scales. Their presence causes the death of branches and twigs and saps the vitality of the host.

PEACH TREE BORER

Host: Flowering plum and cherry.

Description: The adult is a steel-blue moth, about one inch long, which resembles a wasp. The female has clear hind wings and bright orange bands on the abdomen; the male has clear wings and yellow bands on the abdomen. The moths emerge from cocoons from early July to September. Small brown eggs are laid on the bark of the trunk and on the soil nearby. The larvae hatch in about a week, bore into the inner bark and cambium, and continue to feed until cold weather. They overwinter in tunnels in the bark and resume feeding in the spring, reaching a length of about one inch at maturity. Full-grown larvae are white with brown heads. They pupate in light brown cocoons in late May. There is one generation per year.

Damage: Presence of this insect is indicated by masses of gum on the trunk anywhere from two inches to two feet above the ground. This gum is congealed sap which has oozed from the wounds made by the borers.

Trees lose vigor, fail to grow properly, and the leaves turn yellow. When borer tunnels encircle the trunk, the tree is killed.

PINE-NEEDLE SCALE

Host: Nearly all pines, blue spruce, and other spruces.

Description: The pine needle scale is nearly pure white with a yellow spot at one end; the female is about 1/10 inch long, and the male is much smaller. The mature female deposits the reddish eggs under her body late in the summer, where they overwinter and hatch in mid-May. The young crawlers move upward and settle on new needles to feed and mature.

Damage: This scale is conspicuous and usually first appears on the needles of the lower branches. As sap is taken from the needles the green color fades; occasionally the entire tree may turn color. Needles appear nearly white when heavily infested.

Uncontrolled infestations gradually kill branches and entire trees.

PIT-MAKING OAK SCALES

Host: White, English, chestnut, and other oaks.

Description: The two oak scales are much alike in habits and appearance. The adult is nearly circular, convex, smooth, greenish-gold, and about 1/16 inch in diameter. The insects overwinter as adult or nearly full-grown scales. Eggs are laid in the spring; the young hatch in May or June and settle on small twigs and branches to feed. There is one generation per year.

Damage: The pit-making oak scales create oval pitlike depressions in the bark. Attack usually begins on the lower branches and continues upward.

Heavy infestation causes trees to become unthrifty and susceptible to borers. Branches and limbs may be killed and, in extreme conditions, trees may die.

SAN JOSE SCALE

Host: Fruit trees, Cotoneaster, fire thorn, mountain ash, rose, and other members of the rose family.

Description: This scale insect overwinters on the bark of the host as a partly-developed sooty-black scale, capable of enduring near-zero temperatures. In spring when the sap begins to move, the scales begin to feed and grow, reaching maturity at about the time of bloom. Two forms are found at this time. The female is nearly round, about 1/12 inch across with a raised nipple in or near the center. The nipple is pale or reddish-yellow when not covered with secretion. The male is about half as large, longer than it is wide with a raised dot near the end. The male scale at this time emerges as a two-winged insect. After mating, the female gives birth to living young which look like yellow mites. They settle down to feed, molt (becoming flattened yellow sacks), and develop the typical scale appearance. Depending on temperature range, there are two to four generations before the overwintering forms develop.

Damage: When a tree is only slightly infested, a close examination may reveal a few scales on the bark, usually near a bud or some other protected place. Heavy infestation occurs on branches, especially near crotches. If these incrustations are scratched with a knife or fingernail, an oily, yellowish liquid will appear. Cutting into the bark under a scale usually reveals a reddish discoloration of the green tissue.

The appearance of the tree is spoiled by the ash-gray crust. Continued infestation of this scale will result in the death of the host.

SPRUCE BUDWORM

Host: Balsam fir, hemlock, spruce, larch, and pine.

Description: The adult moths are active during July. They are similar in appearance to the leafroller moths. They deposit their green, flat eggs in a long cluster on the needles, with the eggs overlapping like shingles on a roof. Hatching takes place during August, and the tiny larvae spin silken overwintering cases on the twigs, limbs, and buds. Feeding activity starts

after a few warm days in the spring. The larvae eat buds, new needles, and even old needles. They complete their feeding by late June. Full-grown larvae are about 3/4 inches long, with dark brown heads. The body is dark brown with light sides; each segment has yellowish warts which give the worm a sparsely spotted appearance.

Damage: The moths are most active during the evening and can be transported many miles by the winds. A high mortality of infested trees is due to the early spring damage to developing buds and the ensuing defoliation. This is a relatively new pest in Pennsylvania and has been especially destructive to hemlock.

TAXUS MEALYBUG

Host: All species of yew.

Description: The adult female is about 1/16 inch long; a white, powdery, waxy excretion is unevenly distributed on the upper surface of the body with dark red body fluid showing through in four lengthwise lines. Fifteen filaments appear on each side of the body, the rear pair about 1/3 of the total body length. In the fall, living young are produced which overwinter under bark scales and in crevices, and begin to crawl again in April. The young are yellowish, flat, and oval, and have no waxy excretion. They feed by sucking sap through the bark tissue. As they grow, the waxy material accumulates on the upper body. Maturity is reached in mid-June. Male mealybugs are small, winged, and light colored. There may be one or two generations each year.

Damage: Infestations are difficult to detect before a general decline in health and appearance of the plants occurs. The white cottony masses in the crotches of larger twigs and branches are early evidence of infestation. The mealybugs excrete large quantities of honeydew on which black sooty fungus usually grows.

Mealybugs breed rapidly and may become extremely abundant by mid-summer, causing loss of color, wilting, and dropping of needles. The black sooty mold growing on the honeydew reduces the value of the plants.

WHITE-PINE WEEVIL

Host: White pine and spruce.

Description: Often the most damaging pest of white pine and ornamental spruces, this insect is an elongated, brownish snout beetle, about 1/4 inch long. The body is mottled with brown and white scales, with a white spot on the lower third of each wing cover. They overwinter as adults in the litter under the trees, and resume activity from March to May, depending on the temperature. Eggs are deposited in small punctures in the leader of the tree and hatch in seven to ten days. The grubs bore downward as they feed on the inner bark, girdling and killing the leader.

By August, the white grubs are full grown. After a pupal stage of about 10 to 15 days, the adults emerge in the beginning of August to mid-September.

Damage: In the spring, the first evidence of infestation is droplets of resin on the terminal growth. The resin oozes from the holes made by the adult weevils during feeding and egg laying. The second evidence of attack is the dead leader, caused by the feeding larvae. The larvae may be found by cutting open the leader.

By feeding on the inner bark, the developing larvae girdle the leader and cause its death. The amount of stem destroyed varies, but in Pennsylvania, one year's growth is generally affected. When the terminal growth is killed, one or more of the side branches develops as a leader, resulting in a crooked stem.

CALENDAR OF INSECT PROBLEMS
AND SUGGESTED CONTROL

APRIL

Pest	Insecticide	Amount To Use For: 100 gal	1 gal
ELM BARK BEETLE	Methoxychlor 25% E	mist blowers: 48 gal	61 oz
		hydraulic sprayers: 8 gal	10 oz

Note: Keep trees in a vigorous condition. Cutting out and burning weak and dead branches and trees as soon as noticed is the most effective remedy for Dutch elm disease. Spray will offer some additional protection, but is suggested only for very valuable trees. Mist Blowers: Apply about three gallons of spray per tree in April before new growth starts. This spray may spot cars, house paint, and aluminum siding, and should be washed off such surfaces. Hydraulic Sprayers: Apply about 30 gallons of spray per tree in April just before new growth starts.

MAPLE BLADDER GALL MITE	Carbaryl (Sevimol 4)	1 1/2 qt	1 Tbsp

Note: Spray when new leaves on soft maples are about one-fourth expanded. Repeat in 10 days.

MITES	Dormant spray oil	2 gal	5 Tbsp

Note: Apply oil spray when buds start to swell and temperature is about 40° F. Check label for oil-sensitive plants.

SCALE INSECTS	Dormant spray oil	2 gal	5 Tbsp
	Ethion 4 spray oil mixture	2 gal	5 Tbsp

Note: Thoroughly cover infested twigs and limbs with spray. Apply when buds swell and temperature is above 40° F.

APRIL (cont'd)

Pest	Insecticide	Amount To Use For: 100 gal	1 gal
SPRUCE GALL APHID	Carbaryl (Sevimol 4)	1 qt	2 tsp
	Diazinon 50% WP	2 lb	2 Tbsp

Note: Spray infested spruce trees between April 1 and 15 if no treatment was made the previous autumn.

TENT CATERPILLAR	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Dipel 3.2%	1/2 lb	1/2 Tbsp
	Malathion 57% E	2 pt	2 tsp
	Methoxychlor 2 E	2 qt	4 tsp

Note: Treat nest area when still small. Entire tree need not be sprayed.

WHITE PINE WEEVIL	Lindane 20% EC	3 pt	1 Tbsp
	Meta Systox-R 2 E	4 gal	2 3/4 Tbsp

Note: Spray leaders of spruce and white pine during the last half of April.

MAY

BIRCH LEAFMINER	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Dimethoate 2 E	1 pt	1 tsp
	Imidan 50% WP	1 lb	1 Tbsp
	Meta Systox-R 2 E	1 1/2 pt	1 1/2 tsp

Note: Spray birch when leaves are expanded (about May 10) for first brood. Repeat about June 25 for second brood. Soil systemic insecticide for use by commercial growers or professional applicators only. Di-Syston 15% granules at the rate of 2 1/2 oz per inch of trunk diameter. Spread granules evenly from trunk to drip line on all sides. Work into soil and water thoroughly.

CANKERWORMS	Carbaryl (Sevimol 4)	1 qt	1 Tbsp
	Dipel 3.2%	1/2 lb	1/2 Tbsp
	Imidan 50% WP	1 lb	1 Tbsp
	Methoxychlor 2 E	2 qt	4 tsp
	Thuricide HP 3.2%	1/2 lb	1/2 Tbsp

Note: Spray infested trees when damage first appears. Usually noticeable about May 15.

MAY (cont'd)

Pest	Insecticide	Amount To Use For: 100 gal	1 gal
DOGWOOD BORER	Endosulfan (Thiodan) 2 E	2 qt	4 tsp
	Lindane 20% E	3 pt	1 Tbsp
	Note: Spray trunk from ground to lowest branches about May 20. Repeat in 30 days.		
GYPSY MOTH	Biotrol XK 25 WP	3 lb	3 Tbsp
	Dipel or Thuricide HP	1 lb	1 Tbsp
	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Dylox 1.5 oil for aerial application only.		
	Imidan 50% WP	1 lb	1 Tbsp
	Note: Spray infested trees after eggs are mostly hatched but when caterpillars are small (about May 15).		
HONEYLOCUST PLANT BUG	Carbaryl (Sevin) 80 S	1 1/4 lb	1 Tbsp
	Note: Spray when bugs can be jarred from limbs (about May 20).		
LEAFROLLERS ON CRAB-APPLE AND FLOWERING SHRUBS	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Note: Damage starts soon after leaves begin to develop. Spray if over 10 percent of developing terminals show damage.		
OAK LEAFROLLER	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Note: By about May 20, one can determine if infestation is severe enough to warrant spraying.		
PINE SAWFLIES	Carbaryl (Sevimol 4)	1 qt	1 Tbsp
	Note: Spray when larvae are present and damage is noticeable.		

MAY (cont'd)

Pest	Insecticide	Amount To Use For: 100 gal	1 gal
SCALE CRAWLERS	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	plus Malathion 57% E	1 to 2 pt	2 tsp

Note: The scales hatch in late May. The exposed crawlers can be killed with a contact insecticide.

JUNE

ARBORVITAE LEAFMINER

Note: No registration for effective controls.

AZALEA BARK SCALE	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Malathion 57% E	2 pt	2 tsp

Note: Crawlers are present in late June and early July.

BAGWORMS	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Diazinon AG 500	1 pt	1 tsp
	Dipel 3.2%	1 lb	1 Tbsp
	Malathion 57% E	2 pt	2 tsp

Note: Small bagworms are first noticed about mid-June. Insecticides are most effective on small larvae.

BIRCH LEAFMINER	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Dimethoate 2 E	1 pt	1 tsp
	Imidan 50% WP	1 lb	1 Tbsp
	Meta Systox-R 2 E	1 1/2 pt	1 1/2 tsp

Note: Second brood of larvae start mining leaves about June 25.

BLACK VINE WEEVIL	Endosulfan (Thiodan) 50% WP	2 lb	2 Tbsp

Note: Adult weevils start emerging and notching leaves in late June. Thorough spray coverage of plant foliage and ground cover is needed to obtain control.

JUNE (cont'd)

Pest	Insecticides	Amount To Use For: 100 gal	1 gal
BRONZED BIRCH BORER	Lindane 20% E	2 qt	4 tsp
	Note: Spray trunk and larger branches in upper half of tree during first and third weeks of June.		
EUONYMOUS SCALE	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Dimethoate 2 E	2 qt	4 Tbsp
	Malathion 57% E	1 1/2 pt	2 tsp
	Note: Crawler stage is present about mid-June and again in early July.		
HOLLY LEAFMINER	Meta Systox-R 2 E	1 1/2 pt	1 1/2 tsp
	Note: Spray foliage in early to mid June to kill young maggots in the leaves. Di-Syston 15% granules as a soil treatment applied in May as described for Birch leafminer is also effective.		
JUNIPER SCALE	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Malathion 57% E	1 qt	2 tsp
	Note: Spray foliage in late June when crawler stage is present.		
LACE BUGS	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Dimethoate 2 E	1 qt	2 tsp
	Malathion 57% E	1 pt	1 tsp
	Note: Check for lace bugs in early June on azalea and similar hosts. Spray if any are present.		
LILAC BORER	Endosulfan (Thiodan) 2 E	3 pt	3 tsp
	Lindane 20% E	2 qt	4 tsp
	Note: Treat stems in early June and again in late June.		

JUNE (cont'd)

Pest	Insecticide	Amount To Use For: 100 gal	1 gal
MIMOSA WEBWORM	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Diazinon AG 500	1 pt	1 tsp

Note: Treat honeylocust when first browning of leaves is noticed (about mid-June).

RHODODENDRON BORER	Lindane 20% E	3 pt	3 tsp

Note: Spray larger branches and trunk to ground level during first and third weeks of June.

PINE TORTOISE SCALE	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Diazinon AG 500	1 pt	1 tsp
	Malathion 57 E	2 qt	4 tsp

Note: Proper time to spray to kill crawlers is usually between June 15 and 20. Repeat application in 10 days.

JULY

APHIDS	Diazinon AG 500	1 pt	1 tsp
	Malathion 57% E	1 1/2 pt	1 1/2 tsp
	Meta Systox-R 2 E	1 1/2 pt	1 1/2 tsp

Note: These are general aphicides, registered for use on most shrubs and trees. Population of aphids may be a problem on a wide range of plants any time during the season. Sprays are seldom needed. Use only when necessary.

JAPANESE BEETLE	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Malathion 57% E	1 1/2 pt	1 1/2 tsp
	Methoxychlor 2 E	2 qt	4 tsp

Note: Severe defoliation from adult beetles can occur any time during July and August. Spray where needed.

MITES	Kelthane 35% WP	1 lb	1 1/2 Tbsp
	Plictran 50% WP	6 oz	1 tsp

Note: Mite populations often build up to destructive numbers during hot weather in July and August. Spray at early stage of bronzing.

AUGUST

Pest	Insecticide	Amount To Use For: 100 gal	1 gal
FALL WEBWORM	Dipel 3.2%	1/2 lb	2 tsp

Note: Webs usually become noticeable by early August. Spray nest area only. Entire tree need not be sprayed. Unfortunately, many effective insecticides are not registered for this pest.

FLETCHER SCALE	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Malathion 57% E	2 pt	2 tsp

Note: This is one of the most common scale insects on yew. The crawler stage can be killed with a foliage spray in early August.

MIMOSA WEBWORM	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Diazinon AG 500	1 pt	1 tsp

Note: Second-brood larvae are actively feeding about mid-August. Control is often desired.

JAPANESE BEETLE	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 Tbsp
	Malathion 57% E	1 1/2 pt	1 1/2 tsp
	Methoxychlor 2 E	2 qt	4 tsp

Note: Feeding of adult beetles is often severe throughout the month of August. Spray when needed.

SEPTEMBER

MAGNOLIA SCALE	Carbaryl (Sevin) 80 S	1 1/4 lb	1 1/2 tsp
	Malathion 57% E	1 qt	2 tsp

Note: Crawlers start hatching in late August and continue well into September. Spray about September 1 and repeat in 10 days.

SEPTEMBER (cont'd)

Pest	Insecticide	Amount To Use For: 100 gal	1 gal
SPRUCE GALL APHID	Carbaryl (Sevimol 4)	1 qt	2 tsp
	Diazinon 50% WP	2 lb	2 Tbsp

Note: Late September or early October is an excellent time to spray spruce and fir trees to kill the overwintering females.

Prepared by Stanley G. Gesell, Professor, Entomology Extension.

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